

skill; the original sentences have to be individually annihilated before endurable English equivalents can be raised from their ashes. This Dr. Ewart has done so well that the book reads as though it had been written in English.

No one can nowadays write a physiological textbook without being largely indebted to Pfeffer's "Pflanzenphysiologie," and this, in his preface, Prof. Jost acknowledges in the fullest way; but his book is so different from Pfeffer's in scope and manner of presentment that it is essentially an original work.

It is an eminently readable and useful book; it is written in a clear and easy style, and steers a skilful course between some of the difficulties that beset the lecturer. On the one hand the author avoids placing too much stress on what is new, while he by no means neglects the recent literature, and is thoroughly up-to-date in his treatment of the subject. He is not afraid of facing a difficulty or of pointing out where our knowledge fails to solve the problem. He has produced a book admirably suited to the advanced student of an English university, and one that may also be read with advantage by more advanced workers. Jost's manner of stating his case is so suggestive, and he is so open in pointing to possible lines of inquiry, that the book cannot fail to be useful to a wide class of readers.

It is divided into three parts:—(1) Stoffwechsel, (2) Formwechsel, (3) Energiewechsel. Part i. deals with the absorption, transport, and loss of water, with the assimilation of carbon and nitrogen, and with respiration and fermentation. Under Formwechsel (part ii.) we have a general statement of the fundamental problems of development, then come growth and development under constant conditions. This is followed by the effects of the environment on growth, &c., and finally comes a section on periodicity, inheritance, and variation. Part iii. (Energiewechsel) deals with hygroscopic movements, growth-curvatures ("tropisms"), the movements of tendrils, of sleeping plants, &c., and chemotaxis, &c. The whole of part iii. seems to us particularly good, and contains much that is interesting and valuable in the way of discussion. We confidently recommend Prof. Jost's lectures, but since it is the duty of the reviewer to find some fault, we may direct attention to Fig. 141, which is printed upside down.

F. D.

CHRONOLOGICAL CALCULATIONS.

Astronomical and Historical Chronology in the Battle of the Centuries. By William Leighton Jordan, F.R.G.S., F.S.S., &c. Pp. 70. (London: Longmans and Co., 1904.) Price 2s. net.

THE main object of this little work is to contend that what is sometimes called the "astronomical" method of dating events prior to the Christian era is really what was intended to be used when the system of using dates before and after the birth of Christ was first introduced. Hence it is dedicated to the librarians of the cities of Florence and Pisa, in the hope of receiving from some of them "further evidence for the elucidation of the subject."

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Now divisions of this kind involve the drawback of necessitating a reckoning in two directions. This is also the case, for instance, in the centigrade division of the thermometric scale, which is nearly always avoided by the general public in this country, and would be still more in countries which are nearer the equator, by using Fahrenheit's scale, the zero being below the lowest point usually reached in winter, so that a statement of the reading is sufficient, without adding above or below freezing, as the case may be. In dating an event, too, by Christian chronology, we have to state whether it occurred before or after the birth of Christ (or the year accepted as such), which is indicated by affixing the letters B.C. or A.D. But there is this further complication, as compared with a thermometric or other scale, that a degree is a definite point, and everybody knows that 1° below freezing is two degrees below 1° above it. A year is not a definite point of time, and we all know (having had a recent instance of it) what perplexity is caused in many minds when a new century has commenced with regard to which is the first year thereof. Our author reminds us, for instance, how the German Emperor insisted that the present (twentieth) century began at the beginning of the year 1900. A further complication is contained in the fact that we do not know exactly the date of Christ's birth.

But although that question is very interesting from an historical point of view, it is too late now to treat of it as a matter affecting our system of chronology. This is based on the assumed fact that the traditional date of the birth of Christ is the end of the year B.C. 1, so that one year after it was completed at the end of A.D. 1, a century at the end of A.D. 100, nineteen centuries at the end of A.D. 1900, and the twentieth century commenced on January 1, A.D. 1901.

Some people not versed in chronological calculations fancy that astronomers go out of their way to differ from ordinary people when they call the year which is commonly reckoned B.C. 1 (the year preceding A.D. 1) 0, and denominate B.C. 2 as the year - 1. But there is no such affectation of singularity in the matter; a necessity is laid upon the computer in this respect, for if we subtract 1 from 1, the result cannot be anything but 0, and if we subtract 2 from 1, the result must be -1. It is necessary, therefore, to remind ordinary people that if they desire to estimate the number of years from a date in B.C. reckoning to one at the same season in A.D. reckoning, it is not sufficient to add the years together, but unity must be subtracted from the result; from June 1, B.C. 10, for instance, to June 1, A.D. 10, is an interval of not twenty, but only nineteen years.

The author of the work before us desires to prove that those who first used Christian chronology intended that it should be reckoned in this way, the numbers being not cardinal, but ordinal. However, that is a mere matter of curiosity. An inmate of a lunatic asylum, who appeared sane to a visitor, was once asked why he was there. "Oh," he said, "I thought everybody else was mad, and they thought I was; as they were in the majority, they had their way with me, and so I am here."

The majority, in fact, must in all such questions have their way, and the existing system of chronology and its zero point (the end of B.C. 1 or of the year 0 reckoned astronomically) now so extensively pervade all history that they cannot be displaced. As regards the real date of the event on which they are nominally founded, that is another question. It seems clear that Herod the Great died in the spring of 750 by the years of Rome, corresponding to B.C. 4, and that our Lord was probably born towards the end of the preceding year, B.C. 5. Mr. Jordan refers (p. 28) to the proposal to put it back two years further, to A.D. 7, but as that theory is founded on Kepler's suggestion (which cannot be accepted) that the Star of Bethlehem was in fact a conjunction of planets, it may be dismissed as quite untenable. All who have studied mediæval writers on this subject are aware that the original proposal was to date, not from the birth, but from the incarnation of Christ, *i.e.* the Lady Day preceding the nativity; but that was soon merged in the other, which in fact superseded it. We must remind our author that astronomers when making chronological calculations do not call the vulgar era 5 B.C. (for instance) 4 B.C.; they call it A.D.—4, in the ordinary mathematical form when on the other side of the zero point.

It should be added that the book contains some interesting discussions respecting the first use of Christian chronology (superseding the era of Diocletian) and the early cycles used in the determination of Easter. In the application of a cycle there has to be taken into account not only its degree of accuracy (which is only approximate), but the date from which its use has been commenced. It is often forgotten what a twofold operation the Gregorian reformation involved; this, however, was gradually accepted in its entirety in the western church. W. T. L.

TOTEMISM AND EXOGAMY.

Social Origins. By Andrew Lang, M.A., LL.D.
Primal Law. By J. J. Atkinson. Pp. xviii+311.
 (London: Longmans, Green and Co., 1903.) Price 10s. 6d. net.

MR. LANG'S critical genius has done great service to anthropology and the science of religion, and the present work, both in its criticism and constructive theory, definitely advances the study of primitive marriage and social organisation.

The essay on "primal law" deals with the origin of exogamy, and may be considered first. Its author, the late Mr. J. J. Atkinson, spent most of his life in New Caledonia, and knew the natives well. His theory, therefore, merits our careful consideration. He takes man in the semi-brutal stage, before language was evolved—living, as Darwin thought, not in hordes, but in small unsocial groups, each composed of one adult male with several wives and children. The sons of such a family would be expelled as soon as they reached maturity, owing to the fierce sexual jealousy of the father. This picture is based on what we know, little enough, of man-like apes, such as the gorilla; rightly or wrongly, evidence from cattle and other herding animals is also employed. Such, at

least, according to the author, is the genesis of exogamy. He explains the well known avoidance customs between mother and son, brother and sister, as the result of the "primal law," finding a corroboration of his main point in the absence of avoidance between father and daughter. In his account of the further development he is not so successful. The theory, as a whole, is a striking one, and will have to be reckoned with, especially by those who believe in the "horde" as the first form of social organisation, and in communal "marriage" as the original type of union. We are taken so far back in the evolution of man that savage analogies can hardly be applied, and here our difficulties begin. What are the conjugal habits of the higher animals generally, and of the anthropoid apes in particular? Can zoologists give us further evidence beyond the few and possibly doubtful facts hitherto observed on which the theory is based? Another difficulty is the psychological question. We can understand *proprietary* jealousy, and an exclusion of *potential* rivals, both marital and patriarchal; but the sexual instinct of animals in a natural state is as absolutely regulated and free from excess as is that of the normal savage. With regard to the absence of avoidance in the case mentioned above, I am informed by Mr. A. W. Howitt and Prof. Baldwin Spencer that there is no evidence in Australia of such a practice as it would imply. Lastly, one is inclined to suspect single-key theories.

Mr. Lang discusses exogamy, as defined by McLennan, and the origin of totemism. With his usual acuteness, he fixes on essential points. In the question of exogamy, an essential phenomenon is the bisection of a tribe, as commonly in Australia, into two exogamous intermarrying moieties, which contain totem-kins; of this a luminous explanation is offered. An exogamous tendency, of whatever origin, is presupposed; then an exogamous local group, which, after the institution of totemism, finds itself composed of variously named units, owing to the presence of alien women, agrees to intermarry solely with another community similarly composed. Such is the origin of the dual phratry system. This explanation is directly opposed to the prevalent view that the bisection was deliberately arranged at a mass meeting of the primitive horde, which had at last discovered the ill effects of promiscuity. But Mr. Lang himself is bound to admit some deliberate grouping of the totems, for we never find the same in both phratries. A final theory might be expected to supply an automatic reason for this result. A more important difficulty, to my mind, is the arrangement of *connubium* between the two local groups; it does not seem clear enough why so many tribes should owe their origin to a *dual* matrimonial alliance.

The explanation of the origin of totemism is suggested by the practice, found in English and French folk-custom, and paralleled elsewhere, of "blazoning" neighbouring villages with sobriquets, which are frequently animal names. The evidence cited on this head is very interesting, and the essential fact has emerged that totem names are *group names given from without*. When accepted, they would be invested